SCH4C WS-11

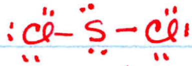
#6 F_2 14e

$:\ddot{F}-\ddot{F}:$

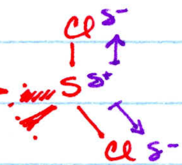
basic geometry is linear → F – F

non-polar bonds
linear shape
non-polar molecule
∴ dispersion

SCl_2 20e⁻

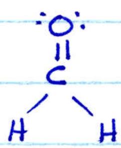


basic geometry is tetrahedral →

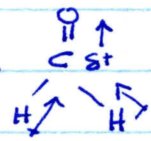


polar bonds
bent shape
∴ polar molecule
∴ dipole-dipole

CH_2O 12e

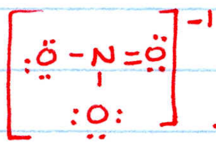


basic geo. is trigonal planar →

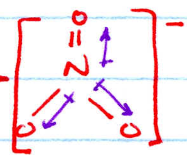


polar bonds
trigonal planar shape
polar molecule
∴ dipole-dipole

NO_3^{-1} 24e⁻

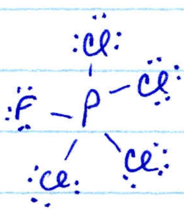


basic geo. is trig. planar →

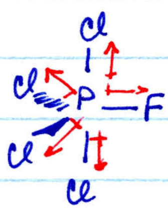


polar bonds
trigonal planar shape
although dipoles cancel out,
this is an ion
∴ electrostatic forces of attraction

PCl_4F 40e⁻



basic geo. trigonal bipyramidal →

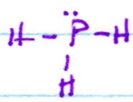


polar bonds
trig. bipyramidal shape
polar molecule
dipole-dipole

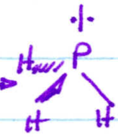
Br_2 (same as in F_2)

SCH4C WS-11

#6 PH_3 8e

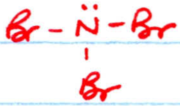


basic geo is tetrahedral →



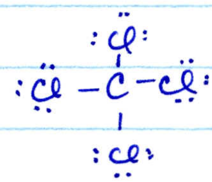
polar bonds
trigonal pyramidal shape
polar molecule
dipole-dipole forces

NBr_3 26e⁻

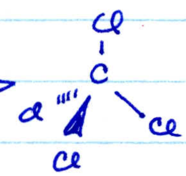


⟶ same results as PH_3

CCl_4 32e⁻



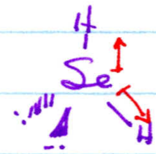
basic geo. is tetrahedral →



polar bonds
tetrahedral shape
non-polar molecule
∴ dispersion forces

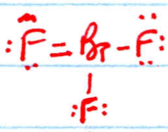
H_2Se 8e⁻

basic geo is tetrahedral →

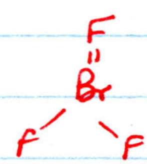


polar bonds
bent shape
polar molecule
dipole-dipole

BrF_3 28e⁻

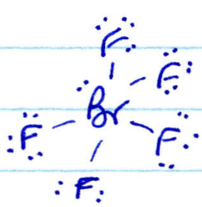


basic geo is trig. planar →

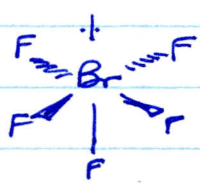


polar bonds
trig. planar shape
non-polar molecule
dispersion

BrF_5 42e⁻

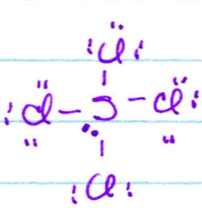


basic geom. is octahedral

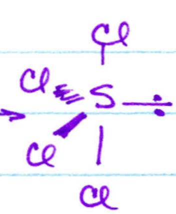


polar bonds
sq. based pyramidal shape
polar molecule
∴ dipole-dipole

SCl_4 34e⁻



basic geom. is trig. bipyramidal →



polar bonds
see-saw shape
polar molecule
∴ dipole-dipole

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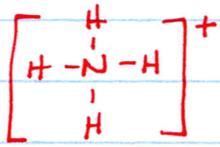
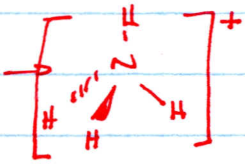
#6

$SnCl_5^{-1}$ (Sn) This one cannot be drawn as Sn is a <u>metal</u> bonded to a non-metal. It falls then under ionic compounds.
4e-

NH_4^+
8e-



basic geometry tetrahedral →



polar bonds
tetrahedral shape
ION

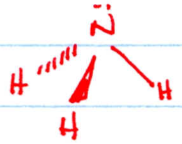
#10 DRY ICE

CO_2
16e-

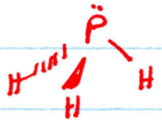
→ linear geometry
non-polar molecule (bond dipoles cancel)
∴ has dispersion forces.

If CO_2 easily changes from a solid to a gas, then its forces of attraction are very weak → the structure supports the idea of dispersion forces of attraction which are the weakest intermolecular force.

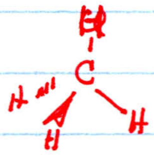
#11 High V.P = weak forces of attraction



hydrogen bonding
(special dip-dip)
very strong forces of attraction
∴ LOWEST VAPOUR PRESSURE



polar molecule
↓
dipole-dipole
∴ forces of attraction weaker than NH_3



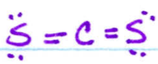
non-polar molecule
↓
dispersion forces
∴ very weak forces of attraction

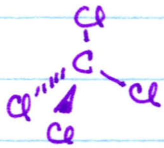
SCH4C WS-11

#12

CS_2 vs CCl_4

For every one of #12, you must first determine the actual shape of the covalent molecule, then determine the polarity + finally the type of intermolecular force





linear — tetrahedral

NP — NP

∴ dispersion — ∴ dispersion

CCl_4 has a higher molecular mass (154u) than CS_2 (78u) ∴ CCl_4 has higher m.p.

Cl_2 — F_2

both are linear, NP molecules ∴ dispersion forces

Since Cl_2 has a greater molecular mass (71u) than F_2, Cl_2's dispersion forces would be greater + thus it has a higher m.p

SiO_2 — CO_2

↑ metal/non-metal — linear, non-polar molecule

IONIC — DISPERSION

↖ higher m.p. (much stronger attraction)

$CHCl_3$ — CF_4

tetrahedral — tetrahedral

Polar — NP.

∴ dipole — ∴ dispersion

∴ $CHCl_3$ has higher m.p.

SCH4C WS-11

#12

BF_3	P_4
non-polar	Non-polar
~~dis~~ ionic	∴ dispersion
↑ higher m.p.	

HI	KI
polar	ionic
dipole	↑ higher m.p.

Na_2O	H_2O
ionic	polar
↑ higher m.p.	H-bonding

CH_4	NH_3
tetrahedral	trig. pyramidal
non-polar	polar
dispersion	H-bonding
	↑ higher m.p.

CaF_2	HF
ionic	ionic

greater difference
in electroneg.
∴ higher m.p.

SCH4C WS-11

#13 a) He NH_3 NF_3 NaCl

trig. pyramidal trig. pyramidal

NP POLAR POLAR IONIC

H-bonding dipole

$NaCl > NH_3 > NF_3 > He$

HF F_2 FCl

all linear

P NP P

H-bonding disp. dipole

$\therefore HF > FCl > F_2$

#14 a) SEE #12(a)

b) HI HBr → both linear, polar molecules

$\therefore$ both dipole-dipole

$\because$ difference in electroneg. is greater for HI then it has the greater dipole + thus the greater m.p.

c) SEE #12(b)

d) GEE!! These are repititions of #12!!